FOREST PRODUCTS
Project Fact Sheet

HIGH SELECTIVITY OXYGEN DELIGNIFICATION

BENEFITS

- Improves overall pulp yields by 3–5 percent
- Provides a simple, inexpensive tool for measuring pulp yield
- Increases strength and brightness of delignified pulp
- Reduces capital costs for delignification
- Lowers the volume of organic material going to the recovery furnace

APPLICATIONS

This new technology can be readily installed as a retrofit in the 26 oxygen-delignification plants now in operation. About 90% of the 100 U.S. bleach plants are also expected to eventually adopt it. The technology will be commercially ready in about 2004.

A Promising New Technology Will Achieve Cost-Effective Pulping and Bleaching While Protecting the Environment

The pulp and paper industry has identified better pulping and bleaching technologies that are in compliance with the Nation's environmental regulations as a key issue in its research agenda for 2000. An extended two-stage, oxygen-delignification process was shown to improve pulp yields by 1 to 4 percent, and there is the potential to improve this process even further.

Researchers want to extend their knowledge of chemical pathways that contribute to the degradation of lignin in kraft pulp cooking and identify the optimal conditions for two-stage delignification. Various parameters will be studied to guide changes in the two stages of delignification.

A greater understanding of how lignin is removed from high kappa kraft pulps and of the optimal operating conditions for accomplishing it will lead to higher pulp yields and a stronger and brighter product.

OFFICE OF INDUSTRIAL TECHNOLOGIES
ENERGY EFFICIENCY AND RENEWABLE ENERGY • U.S. DEPARTMENT OF ENERGY

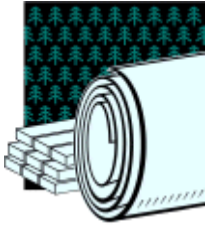
PROJECT DESCRIPTION

Goal: To develop improved technologies for extended oxygen delignification in U.S. pulping and bleaching operations.

This project will achieve its goal through the following objectives: 1) identifying pulping conditions that optimize single and two-stage oxygen delignification, 2) identifying structural features of lignin that enhance reactivity toward extended oxygen delignification of high kappa pulps, 3) identifying factors that minimize carbohydrate degradation, 4) developing a simple reproducible method of quantifying laboratory and field yield benefits, and 5) developing processing conditions that reduce capital requirements for extended oxygen delignification but optimize pulp yield.

PROGRESS & MILESTONES

- NC State conducted previous research on the relationship between pulp yield and extended oxygen delignification operating parameters that pertain to this project.
- The Institute of Paper Science and Technology undertook preliminary studies of the nature of residual lignin during conventional and extended oxygen delignification processes.
- Researchers are in the process of preparing hardwood and softwood pulps.
- Investigation into the effects of NaOH, temperature, mixing, non-process elements (NPEs), and MgSO4 in single-stage high selectivity oxygen (HSO) delignification is underway.
- The three critical decision points for the research will be:
  - Identifying optimal conditions for U.S. furnish,
  - Determining optimal lignin and carbohydrate structure(s) required to enhance yield, and
  - Developing a mill sensor to track yield benefits from these technologies.



PROJECT PARTNERS
Institute of Paper Science and Technology
Atlanta, GA

North Carolina State University/NC State
Raleigh, NC

Air Products and Chemicals, Inc.
Allentown, PA

Ahlstrom Machinery Inc.
Glens Falls, NY

Vinings Industries, Inc.
Atlanta, GA

FOR ADDITIONAL INFORMATION PLEASE CONTACT:

Mark Paster
Office of Industrial Technologies
Phone: (202) 586-2821
Fax: (202) 586-3237
e-mail: mark.paster@ee.doe.gov

Dr. A.J. Ragauskas
Dr. L.A. Lucia
Institute of Paper Science and Technology
Atlanta, GA 30318-5794
Phone: (404) 894-5700
e-mail: arthur.raguskas@ipst.edu

Please send any comments, questions, or suggestions to webmaster.oit@ee.doe.gov

Office of Industrial Technologies
Energy Efficiency and Renewable Energy
U.S. Department of Energy
Washington, D.C. 20585

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